

*EVALUATION OF ANTECEDENT STIMULUS PARAMETERS
FOR THE TREATMENT OF ESCAPE-MAINTAINED
ABERRANT BEHAVIOR*

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We evaluated a methodology for identifying the range of stimulus features of antecedent stimuli associated with aberrant behavior in demand contexts in natural settings. For each participant, an experimental analysis of antecedents (Phase 1) was conducted to confirm the hypothesis that task instructions occasioned increases in aberrant behavior. During Phase 2, specific stimulus features associated with the presentation of task instructions were assessed by evaluating the child's behavior across two distinct settings, therapists, and types of tasks in a sequential fashion. Aberrant behavior occurred immediately across settings and therapists, presumably because the presence of a discriminative stimulus for escape-maintained behavior (the delivery of a task instruction) occasioned aberrant behavior. However, aberrant behavior decreased initially across tasks, suggesting that familiarity with the task might be a variable. During Phase 3, an experimental (functional) analysis of consequences was conducted with 2 participants to verify that aberrant behavior was maintained by negative reinforcement. During Phase 4, a treatment package that interspersed play with task instructions was conducted to disrupt the ongoing occurrence of aberrant behavior. Immediate and durable treatment effects occurred for 2 of the 3 participants.

DESCRIPTORS: aberrant behavior, antecedent analyses, in-home treatment, stimulus control, young children

Recent studies have shown that functional analysis procedures (Arndorfer, Miltenberger, Woster, Rortvedt, & Gaffaney, 1994; Derby et al., 1997; Wacker et al., 1998) can

be conducted successfully in home settings by parents. In addition to having practical benefits, analyses conducted in the home offer an opportunity to expand our understanding of the variables associated with aberrant behavior. For example, the antecedent stimuli associated with behavior that is maintained by negative reinforcement have not been studied extensively in natural settings. For example, we do not know whether aberrant behavior is under the stimulus control of a narrow set of stimulus features or a broad range of stimuli. Thus, research to identify the degree of stimulus control of negatively reinforced behavior may influence both our overall knowledge of these behaviors and the treatments we select (Smith & Iwata, 1997; Smith, Iwata, Goh, & Shore, 1995).

Typically, assessment of aberrant behavior is conducted in one setting, with one therapist, and with one specific task demand, in-

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struction, or activity. This approach limits our ability to identify specific discriminative stimuli associated with aberrant behavior. If functional analyses are conducted in familiar settings, such as the child's home, then analysis can include a broader range of naturally occurring stimuli.

One method for identifying the range of associated antecedent stimuli is to conduct a two-phase analysis. In the first phase, the assessment is conducted in a typical manner: in the presence of a familiar therapist in one setting and with one task instruction. In the second phase, the range of stimuli can be assessed systematically by varying specific stimuli within each antecedent category (therapist, setting, and task). In this way, the range of antecedent stimuli associated with aberrant behavior maintained by negative reinforcement can be partially evaluated.

Halle and Holt (1991) provided a methodology for studying stimulus control. They first taught an adaptive response (saying "please") under a complex array of distinct antecedent stimuli. The specific stimuli that controlled responding posttreatment were then identified, in part, by separate presentations of each stimulus or combinations of stimuli. Similar results using a comparable methodology were reported by Schussler and Spradlin (1991).

A similar approach might be useful for studying previously acquired aberrant behavior. When the general category of antecedents associated with aberrant behavior has been identified via an experimental analysis, then different aspects of those stimuli might be varied. For example, the type of task, the therapist delivering the task instruction, or the setting in which the task instruction is presented might be varied systematically to study the range of stimuli associated with aberrant behavior.

The categories of therapist, setting, and task appeared to be a reasonable set of antecedent categories given the stimulus gen-

eralization results of Shore, Iwata, Lerman, and Shirley (1994). Shore *et al.* studied generalization effects of an escape extinction treatment procedure used to reduce aberrant behavior by changing one stimulus parameter at a time (e.g., introduction of an unfamiliar setting, task, or therapist). Overall, the degree of stimulus generalization was low until additional training within each category was conducted. These results suggest, then, that stimulus control across these categories of antecedent variables should not be assumed. For this reason, we selected these same three categories for our Phase 2 analysis.

The purpose of the present study was to define a process for assessing the stimulus control of aberrant behavior prior to treatment in order (a) to identify the discriminative stimuli for aberrant behavior, (b) to determine the range of stimuli associated with aberrant behavior during task instructions, and (c) to select a treatment package to disrupt the antecedent-stimulus-response relationship of aberrant behavior. In Phase 1, we conducted an experimental analysis of antecedents, based on the methodology of Carr and Durand (1985), to confirm the hypothesis that task instructions set the occasion for aberrant behavior. We evaluated behavior when task instructions were either present or absent and also studied the role of adult attention and item preference on aberrant behavior. The results of Phase 1 demonstrated that the child responded differently to the same therapist in the same setting, depending on whether the therapist presented a task instruction. Aberrant behavior occurred only when instructions were present and did not occur when instructions were absent.

In Phase 2, we examined the influence of different antecedent stimuli on the child's response to task instructions. Unfamiliar people, unfamiliar settings, and unfamiliar tasks were used to control for history of reinforce-

ment and to isolate the effect of task instructions from other stimuli. For example, an increase in aberrant behavior across sessions with an unfamiliar task, in an unfamiliar setting, or with an unfamiliar therapist would suggest that the behavior was not associated with a specific task, therapist, or setting, but rather was acquired quickly across stimuli associated with task instructions. This pattern suggests that treatment might focus on disrupting stimulus control by, for example, removing and then presenting task instructions in a rapid, unpredictable manner to prevent the child from discriminating their presence.

In Phase 3, for 2 of the children, we conducted a functional analysis based on the methodology of Iwata, Dorsey, Slifer, Bauman, and Richman (1982/1994) to determine directly that negative reinforcement maintained aberrant behavior. In Phase 4, we implemented a treatment package based specifically on the results of assessment in Phase 2. In Phase 2, instructions set the occasion for aberrant behavior, but it was possible to disrupt the instruction-aberrant response context. In Phase 4, we combined the components of interspersing task instructions with play and escape extinction and evaluated both the immediate and long-term effects of this treatment package on both aberrant and adaptive responding.

METHOD

PARTICIPANTS

Participants were 3 children enrolled in an early intervention project (Wacker et al., 1998). Luke was 3 years 1 month of age, had asthma and delayed verbal communication skills (i.e., he used three to four words), and had been diagnosed with moderate mental retardation. The primary behaviors of concern were self-injury (head banging), aggression (hitting, biting, pinching), destruction (throwing toys, pulling objects off shelves), and disruption. At the con-

clusion of assessment and prior to initiation of treatment, Luke attended half-day programming in an early childhood special education classroom. No medications were prescribed for Luke.

Todd was 4 years 5 months of age, had delayed verbal communication skills (i.e., he used four or more words) and *XXX* syndrome, and had been diagnosed with moderate mental retardation. The primary behaviors of concern were aggression (hitting, pushing), destruction (jumping on furniture, throwing toys), and disruption. Todd was enrolled in a half-day general education preschool with special education services provided by a full-time associate. No medications were prescribed for Todd.

Trevor was 5 years 7 months of age, had delayed verbal communication skills (i.e., he used four or more words), and had been diagnosed with moderate to severe mental retardation, visual impairment (moderated with glasses), and attention deficit hyperactivity disorder. The primary behaviors of concern were self-injury (head banging, finger biting), aggression (pulling hair, hitting others with toys), destruction (throwing toys, pulling objects off shelves), and disruption. Trevor attended self-contained special education classes. He received methylphenidate two times per day (7.5 mg at 8:00 a.m. and 5 mg at 11:00 a.m.; weight 16.3 kg) during assessment and the initial phases of treatment. His medication dosage was changed twice during treatment (during the third treatment probe, the dose was changed to 10 mg at 8:00 a.m. and 11:00 a.m.; beginning with the fourth treatment probe, the dose was changed to 10 mg at 7:15 a.m., 10 mg at 10:30 a.m., and 5 mg at 1:30 p.m.).

THERAPISTS, TASKS, AND SETTINGS

During Phases 1, 3, and 4, the child's mother always served as the therapist and received coaching from the experimenter. These sessions were conducted in the family

Table 1
Summary of Familiar and Unfamiliar Stimulus Parameters

Participant		Task	Setting	Therapist
Luke	Familiar	Blocks	Home	Mother
	Unfamiliar 1	Pegs	Gym	Grant staff
	Unfamiliar 2	Puzzle	Classroom	Local educator
Todd	Familiar	Blocks	Home	Mother
	Unfamiliar 1	Pegs	Outpatient clinic	Grant staff
	Unfamiliar 2	Marble apparatus	Hospital classroom	Grant staff
Trevor	Familiar	Stacking cups	Home	Mother
	Unfamiliar 1	Puzzle	Outpatient clinic	Grant staff
	Unfamiliar 2	Pegs	Hospital classroom	Local educator

living room of each child's home. During Phase 2, two unfamiliar therapists (adults who had not previously interacted with the child), two unfamiliar settings, and two unfamiliar tasks were used to assess variability in child behavior. (See Table 1 for a summary of tasks, settings, and therapists used during Phase 2.) Each unfamiliar therapist conducted the assessments in the child's living room. The unfamiliar setting assessment occurred in two locations the child had not previously visited, and the child's parent conducted those sessions. A Panasonic camcorder (Model PV710) was mounted on a tripod, and all sessions were videotaped for subsequent data collection. One or two experimenters were present at all times to operate the video equipment and to coach the parent or unfamiliar therapist.

Tasks were divided into familiar and unfamiliar categories. Criteria for selection of familiar tasks included (a) observation that an item was present in the child's home, (b) parent report of the child's previous experience with an item, and (c) observation that the child had the necessary motor skills to perform the requested manipulation of the item (e.g., stacking blocks). Criteria for selection of unfamiliar tasks included (a) observation that an item was not present in the child's home, (b) parent report that the child did not have previous experience with the

item, and (c) requested manipulations with the item were topographically similar to those made with a familiar item (e.g., placing pegs in a peg board).

MATERIALS

Familiar items, rated as preferred by the parent and verified through a preference assessment, were presented to the child noncontingently during free-play and higher preference conditions. Preference assessment procedures were based on those used by DeLeon and Iwata (1996) and involved providing the child with noncontingent access to three or four items during three to four 5-min sessions. A 6-s partial-interval recording system was used to measure the percentage of 6-s intervals during which the child played with each item. (A list of specific items identified for each child is available from the first author on request.) The item that the child played with most was identified as a higher preference item. For the purposes of this study, higher preference items were defined as those chosen $\geq 60\%$ of the time across sessions, and lower preference items were defined as those chosen $\leq 20\%$ of the time across sessions. For Luke and Todd, the higher preference item was building blocks, and for Trevor it was stacking cups.

RESPONSE DEFINITIONS

Child Behavior

Three categories of child responses were recorded using a 6-s partial-interval recording procedure: (a) aberrant behavior, (b) task engagement, and (c) positive social interactions. The occurrence of aberrant behavior superseded the recording of task engagement, and task engagement superseded the recording of positive social interactions for child behavior. Task compliance was recorded using an event recording procedure.

Aberrant behavior. Self-injury, destruction, aggression, and disruptive behaviors were collapsed into one category labeled aberrant behavior. Self-injurious behaviors consisted of (a) head banging (Luke and Trevor), defined as contact of the head with a stationary object (e.g., floor, crib); and (b) hand or finger biting (Trevor), defined as closure of the teeth on any part of the skin from the hand to fingertips. Aggression (Luke, Todd, and Trevor) was defined as pushing or hitting others, striking others with an object, pulling others' hair, or biting or pinching others. Destructive behaviors (Luke, Todd, and Trevor) were defined as throwing, striking, or knocking over objects and kicking or jumping on furniture. Disruptive behaviors (Luke, Todd, and Trevor) were defined as attempting to leave the observation area, crying, loud vocalizations and screaming, or the lack of responding for 12 s (following first task instruction) or 6 s (following each subsequent task instruction).

Task engagement. Task engagement (collected during Phases 1 and 4) was defined as the child reaching for the task item, appropriately placing the item, or reaching to place the item in the appropriate place following an instruction by the parent. Task engagement was recorded if the child approached or initiated the task at any time within the 6-s interval.

Positive social interactions. Positive social

interactions were defined as any appropriate behavior other than compliance or task engagement and included toy play with an adult, verbal interactions, or signs of affection (e.g., smiling, laughing, and hugging). Toy play was defined as the child and adult exchanging or jointly manipulating a toy.

Task compliance. Compliance to task instructions was recorded during task instruction sessions of the experimental analysis (Phase 1) and during treatment probes (Phase 4). Compliance was defined as the child performing a requested task without physical resistance to the first instruction of the session within 12 s and to each subsequent instruction within 6 s. Initially, 12 s were allowed following the first instruction to permit time for adult modeling of the instruction. Compliance was calculated by dividing the number of task instructions followed by appropriate responding by the number of task instructions and multiplying by 100%.

Adult Behavior

Two categories of adult responses were recorded using a 6-s partial-interval recording procedure: (a) positive social interactions and (b) reprimands or redirection. The occurrence of reprimands or redirection superseded the recording of positive adult social interactions for adult behavior. Task instructions were recorded using an event recording procedure.

Positive social interactions. Positive adult social interactions were defined as verbal or nonverbal contact with the child. Examples included praise, discussion of toys and play items, exchanging or joint playing with items, hugging, tickling, smiling, and clapping.

Reprimands or redirection. Reprimands were verbal statements by the adult that followed aberrant behaviors and expressed disapproval (e.g., "no," "stop that!"). Redirection was defined as physical contact with the

child to stop aberrant behavior and promote compliant behavior. Examples of redirection included blocking a child's hand to prevent self-injury or aggression and guiding the child back to the observation area.

Task instructions. Task instructions were defined as a direction by the adult for the child to engage in a specific task (e.g., "Luke, place this red block on top of this blue block."). Task instructions were delivered every 15 s to 20 s during the task instruction conditions (Phases 1 and 2), the unfamiliar task conditions (Phase 2), and the escape condition (Phase 3). Instructions were presented every 30 s to 40 s during all conditions of Phase 4. Approximately 20 instructions were delivered per session across Phases 1, 2, 3, and 4.

INTEROBSERVER AGREEMENT

Interobserver agreement was assessed by having a second observer independently record parent and child behaviors using the videotapes. Interobserver agreement was obtained during at least the first 2 min of every session conducted during Phases 1, 2, and 3, and during the first 3 min of every session conducted during Phase 4. Interobserver agreement was assessed for adult and child behavior for 95% of all 6-s partial-interval recorded sessions and 92% of all event-recorded sessions. Agreement was assessed across 41% of total session minutes.

Interobserver agreement for task compliance and task instructions was calculated using an event-by-event agreement ratio (Kazdin, 1982). Agreement was defined as each observer recording the same behavior code during the same sequence. Interobserver agreement was calculated by dividing the number of agreements by the number of agreements plus disagreements and multiplying by 100%. Interobserver agreement was calculated separately for adult and child behaviors and was never lower than 90% dur-

ing any phase ($M = 96\%$; range, 90% to 100%).

Interobserver agreement was calculated on an interval-by-interval basis for occurrence of all other behaviors (Kazdin, 1982). An agreement was scored when both observers recorded the same child or adult behavior during the same interval. Occurrence agreement was calculated by dividing the number of agreements by the number of agreements plus disagreements and multiplying by 100%. Interobserver agreement was calculated separately for adult and child behaviors and was never lower than 90% across any phase ($M = 96\%$; range, 90% to 100%).

EXPERIMENTAL DESIGN

Multielement analyses were conducted in Phase 1 to assess aberrant behavior across three pairs of conditions: (a) attention versus no attention, (b) task instruction versus free play, and (c) higher versus lower preference. A combination multielement and reversal design was used in Phase 2 to assess the occurrence of aberrant behavior across distinct task instruction and free-play conditions. In Phase 3 (functional analysis), multielement analyses were conducted for Todd and Trevor as a direct assessment for negative reinforcement as a maintaining variable for aberrant behavior. An AB design was used to evaluate treatment (Phase 4).

PROCEDURE

Prior to Phase 1, each child's parent was asked to complete a child behavior/time selection data form based on the scatterplot analysis described by Touchette, MacDonald, and Langer (1985) and Derby *et al.* (1997). Parents conducted a scatterplot analysis to document the activities, people, and settings associated with aberrant behavior. They were instructed to record the frequency of aberrant behavior for 1 week in 30-min time blocks between the hours of 5:00 a.m. and 11:00 p.m. In addition to record-

ing the frequency of behavior, parents were instructed to use the same form to identify the antecedents, specific behaviors, and consequences associated with aberrant behavior. At the conclusion of 1 week, a parent interview was conducted to discuss the information obtained and to identify item preferences. Based on the descriptive assessment we were able to (a) select the time reported to be the most problematic for weekly observation, (b) generate the hypothesis that demands (presentation of task instructions) set the occasion for aberrant behavior, and (c) identify a range of stimuli (activities, settings, and people) associated with aberrant behavior (to be tested during Phase 2). In all subsequent phases, the first author coached parents or unfamiliar therapists on specific procedures.

Phase 1: Experimental Analysis of Antecedents

Throughout Phase 1, aberrant behavior was blocked in a neutral fashion, and no programmed consequences were presented for aberrant behavior (i.e., no reprimands, no escape, and no access to higher preference items contingent on aberrant behavior). Only one antecedent variable was manipulated at a time.

Task instruction versus free play. Higher preference tasks were presented to the child by the parent with ongoing attention across both conditions. During free-play conditions, the child was allowed to direct the play with the higher preference task (e.g., the child could build with blocks in any order) and the parent played with the child without providing instructions. Attention was provided noncontingently every 15 s to 20 s. No programmed consequences occurred for aberrant behavior during the free-play condition.

During the task instruction condition, the child had access to the same higher preference items as during the free-play condition,

but the adult directed the child's play. For example, if the child typically chose to build with blocks during free play, the instruction involved giving the child one block at a time and telling him how to build with the blocks (e.g., "Luke, put this green block on the red block.") In this way, preference (same item) and skills (same motor responses) were controlled, and the task varied only with the instruction provided by the parent. Attention in the form of instructions was presented every 15 s to 20 s during the task, regardless of the child's response. If the child complied with the instruction, the parent initiated a different instruction. If the child did not comply with parental instructions within 12 s (initial instruction) or 6 s (subsequent instruction), the parent repeated the same instruction every 15 s to 20 s until the child complied or the session ended.

Higher versus lower preference. This condition was similar to free play except that only one item was available noncontingently with ongoing social attention every 15 s to 20 s. The item was either the same free-play item (higher preference) or a lower preference item. No instructions were presented during either condition.

Attention versus no attention. During the attention condition, the parent (a) provided ongoing attention (every 15 to 20 s) to the child in the form of comments about the items, (b) manipulated the item with the child, or (c) provided social contact (e.g., hugs, smiles, rubbing the child's back). During the no-attention condition, the parent sat near the child but diverted her attention to the experimenter and ignored all child behaviors. The child had noncontingent access to the higher preference item and was given no instructions across both conditions.

Phase 2: Analysis of Range of Antecedent Stimuli

Phase 2 was conducted to test directly the effects of different stimulus variables on the

child's response to task instructions. During all procedures aberrant behavior was blocked in a neutral fashion, and no programmed consequences were presented for aberrant behavior.

Free play. Tasks were the same higher preference tasks used in Phase 1. A familiar therapist (the parent) conducted free play in both familiar and unfamiliar settings.

Familiar task instruction. Tasks were the same higher preference tasks used in the task instruction condition of Phase 1. A familiar therapist (the parent) delivered instructions in a familiar setting (the home).

The task instruction and free-play conditions from Phase 1 served as the initial baseline condition for Phase 2. The procedures for Phase 2 were identical to those described in Phase 1. Two unfamiliar settings, two unfamiliar therapists, and two unfamiliar task instructions were evaluated sequentially in a counterbalanced order across children. As each stimulus was changed, the remaining two were held constant (e.g., when setting was assessed, the familiar task and therapist were used). This interspersing of both the familiar task instruction and free-play sessions between unfamiliar stimulus conditions was replicated prior to each stimulus assessment, with the exception of the setting assessment. At least two consecutive sessions were conducted for each change in stimuli, followed by a return to the familiar task instruction (i.e., familiar task, setting, and therapist) and free-play conditions. The sequential comparison of familiar and unfamiliar task instructions with free play was continued throughout this phase to determine whether overall disruption in child behavior occurred or if appropriate behavior was observed when task instructions were absent. The combined analysis permitted inspection of changes in behavior associated with specific stimulus parameters.

Analysis of unfamiliar tasks. Two unfamiliar tasks (preference unknown) were pre-

sented to the child by the parent in the home. Each unfamiliar task was presented with parent-directed task instructions. Modeling of the task and simple verbal directions were provided for each instruction. A 1-min break or 5 min of free play followed each 5-min task instruction session. This sequence was repeated two to four times across children for both unfamiliar tasks. Assessment of each unfamiliar task was conducted for a minimum of three sessions per child over an average of 2 days.

Analysis of unfamiliar settings. For each setting, the parent presented the familiar task instruction for 5 min and then the child received either a 1-min break or 5 min of free play. The two settings were evaluated sequentially.

Analysis of unfamiliar therapists. The child was introduced to an unfamiliar therapist by the experimenter and the parent. The unfamiliar therapist presented the familiar task and instructions for 5 min to the child in the child's home, followed by a 1-min break or 5 min of free play. Free-play and familiar task instruction sessions were repeated after the completion of assessment with the first unfamiliar therapist, followed by assessment with the second unfamiliar therapist. Assessment of each unfamiliar therapist was conducted for a minimum of two sessions per child (range, 2 to 3), and sessions occurred over 1 to 2 days.

Phase 3: Experimental (Functional)

Analysis of Consequences

All sessions were 5 min in length and were conducted in each child's living room, with higher preference items and with the mother as the therapist. During the escape condition, all task instructions were delivered in the same fashion as in the task instruction condition in Phase 1, except that if the child did not comply with an instruction, the instruction was discontinued and the child was given a 15-s to 20-s break. During this

break, the child was allowed to play with the same higher preference item, but no instructions were given. The attention condition was similar to the no-attention condition in Phase 1, except that aberrant behavior resulted in parent attention for 15 to 20 s (e.g., "Todd, don't throw the block"). The tangible condition was similar to the higher preference condition of Phase 1, except that the parent initially removed access to preferred items and returned them to the child for 15 to 20 s for each occurrence of aberrant behavior. The free-play condition was identical to the free-play condition from Phase 1.

Phase 4: Treatment Probes

For all 3 children, the results of Phases 1, 2, and 3 indicated that aberrant behavior was maintained by escape from task instructions. During Phase 2, all children displayed decreased problem behavior when task instructions were absent (i.e., free play), and a temporary reduction in problem behavior was often observed when unfamiliar tasks were presented. Given these findings, we selected a treatment procedure in which free play was interspersed with task instructions using the same higher preference items used in the task instruction/escape condition of Phases 1, 2, and 3, and escape extinction was included to discontinue negative reinforcement.

Parents were given instructions on treatment implementation and were asked to conduct treatment sessions on a daily basis. The specific components of treatment included (a) free play prior to first task instruction, (b) specific task instruction, (c) escape extinction, (d) contingent praise and access to 1 min of free play after compliance with the instruction, and (e) choice of multiple free-play items. One or two 10-min treatment probes were conducted during each weekly or monthly visit. We evaluated the effects of embedding the familiar task in-

struction within the context of free play during each 10-min treatment probe. After 1 min of free play, the parent presented a specific task instruction to the child every 30 to 40 s. This rate of instruction was 50% of the rate used in Phases 1 through 3, but the session was twice as long. If the child complied with the instruction, the parent provided praise and positive social attention (e.g., clapping, saying "good job," or modeling the word "play") and the child earned access to 1 min of free play with higher preference items previously described and his choice of other items. If the child did not comply, the instruction was repeated and escape extinction continued until the child complied with the adult instruction.

For Luke, treatment probes were conducted 10 times during 4 months. For Todd, treatment probes were conducted eight times during 3 months. For Trevor, treatment probes were conducted seven times during 3 months.

RESULTS

Results of the descriptive assessment for each child suggested that both attention and task instructions were associated with aberrant behavior and that aberrant behavior occurred across different people, settings, and tasks or activities.

PHASE 1: EXPERIMENTAL ANALYSIS OF ANTECEDENTS

The results of Phase 1 showed that the presentation of task instructions was associated with aberrant behavior for each child. Figure 1 depicts the percentage of intervals with aberrant behavior during Phase 1 for Luke, Todd, and Trevor. Mean percentage of aberrant behavior was 85% (range, 78% to 94%) for Luke, 86% (range, 76% to 94%) for Todd, and 23% (range, 18% to 28%) for Trevor during task instruction sessions. In contrast, low percentages of aberrant be-

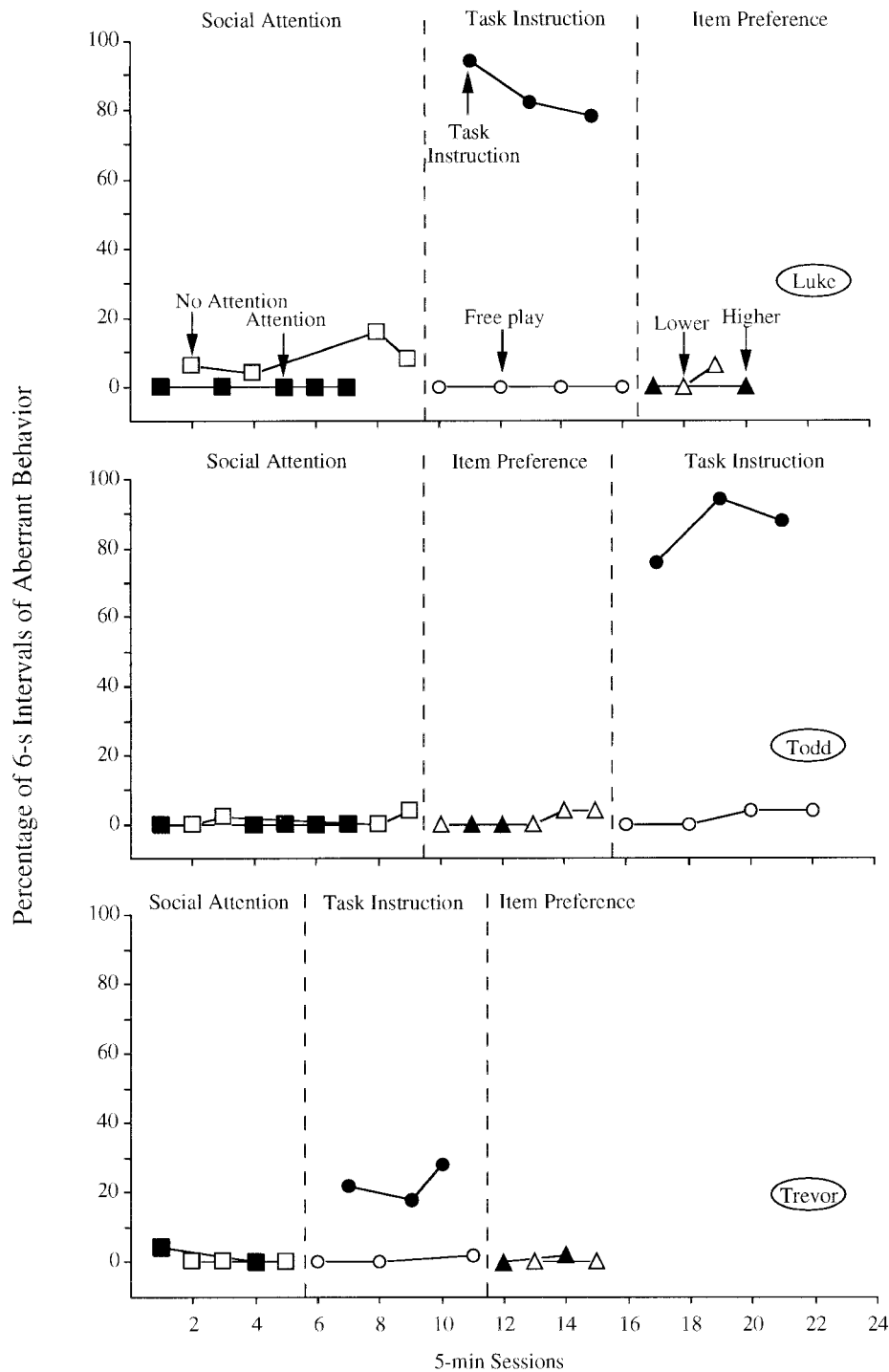


Figure 1. Percentage of 6-s intervals of aberrant behavior during experimental analysis of antecedents (social attention, task instruction, item preference) for Luke (top panel), Todd (middle panel), and Trevor (bottom panel).

havior were observed during free play and across manipulations of social attention and item preference. Mean percentage of aberrant behavior during no-attention sessions was 9% (range, 4% to 16%) for Luke, 2% (range, 0% to 4%) for Todd, and 0% for Trevor. Mean percentage of aberrant behavior during lower preference sessions was 3% (range, 0% to 6%) for Luke, 2% (range, 0% to 4%) for Todd, and 0% for Trevor. Phase 1 confirmed that task instructions exerted stimulus control over aberrant behavior when the variables of therapist, setting, and task were held constant.

PHASE 2: ANALYSIS OF RANGE OF ANTECEDENT STIMULI

During Phase 1, the child responded differently to the same therapist, task, and setting according to the presence or absence of task instructions. Phase 2 was conducted to evaluate whether the child responded differently to task instructions when the therapist, setting, and task varied. Figure 2 depicts the percentage of aberrant behavior during Phase 2 for Luke, Todd, and Trevor. The first conditions of baseline and free play are the same data from the task instruction and free-play sessions of Phase 1.

Luke's mean percentage of aberrant behavior was 50% (range, 32% to 65%) for the first unfamiliar task and 39% (range, 0% to 72%) for the second unfamiliar task. For both tasks, aberrant behavior increased across sessions. Thus, stimulus control over responding either occurred immediately or was quickly acquired. When the familiar task instruction was repeated, aberrant behavior occurred at a level similar to that observed in baseline ($M = 87\%$; range, 62% to 100%). In comparison, mean frequency of aberrant behavior was $<1\%$ (range, 0% to 4%) during the free-play sessions. The mean percentage of aberrant behavior across the two unfamiliar settings was 96% (range, 90% to 100%), which was similar to base-

line percentages of aberrant behavior. Mean percentage of aberrant behavior across the two unfamiliar therapists was 87% (range, 68% to 100%), which was also similar to baseline. Thus, in every case, task instructions occasioned aberrant behavior, and a return to free play resulted in an immediate reduction of aberrant behavior to zero or near zero regardless of the context.

Todd's mean percentage of aberrant behavior across the two unfamiliar therapists was 98% (range, 96% to 100%), which was similar to baseline percentages of aberrant behavior. Mean percentage of aberrant behavior across the two unfamiliar settings was 95% (range, 94% to 96%), which was also similar to baseline. Mean percentage of aberrant behavior during the first unfamiliar task was 67% (range, 40% to 94%) and was 0% across all sessions for the second unfamiliar task. As with Luke, during the first unfamiliar task analysis, there was an immediate but temporary reduction in aberrant behavior (40%, 68%, 94%). There was no occurrence of aberrant behavior across all four sessions of the second unfamiliar task. When the familiar task instruction was repeated, aberrant behavior returned to baseline levels across the phase, with the mean percentage of aberrant behavior being 90% (range, 76% to 96%). Thus, familiar task instructions always occasioned aberrant behavior, but both free play and at least one change in task resulted in an immediate reduction of aberrant behavior to zero or near zero regardless of the context.

Trevor's mean percentage of aberrant behavior across the two unfamiliar settings was 68% (range, 54% to 82%), which exceeded the percentages of aberrant behavior observed during baseline. The unfamiliar task analysis showed that the mean percentage of aberrant behavior during the first unfamiliar task was 27% (range, 10% to 42%) and was 19% (range, 6% to 42%) for the second unfamiliar task. For both tasks, lower levels of

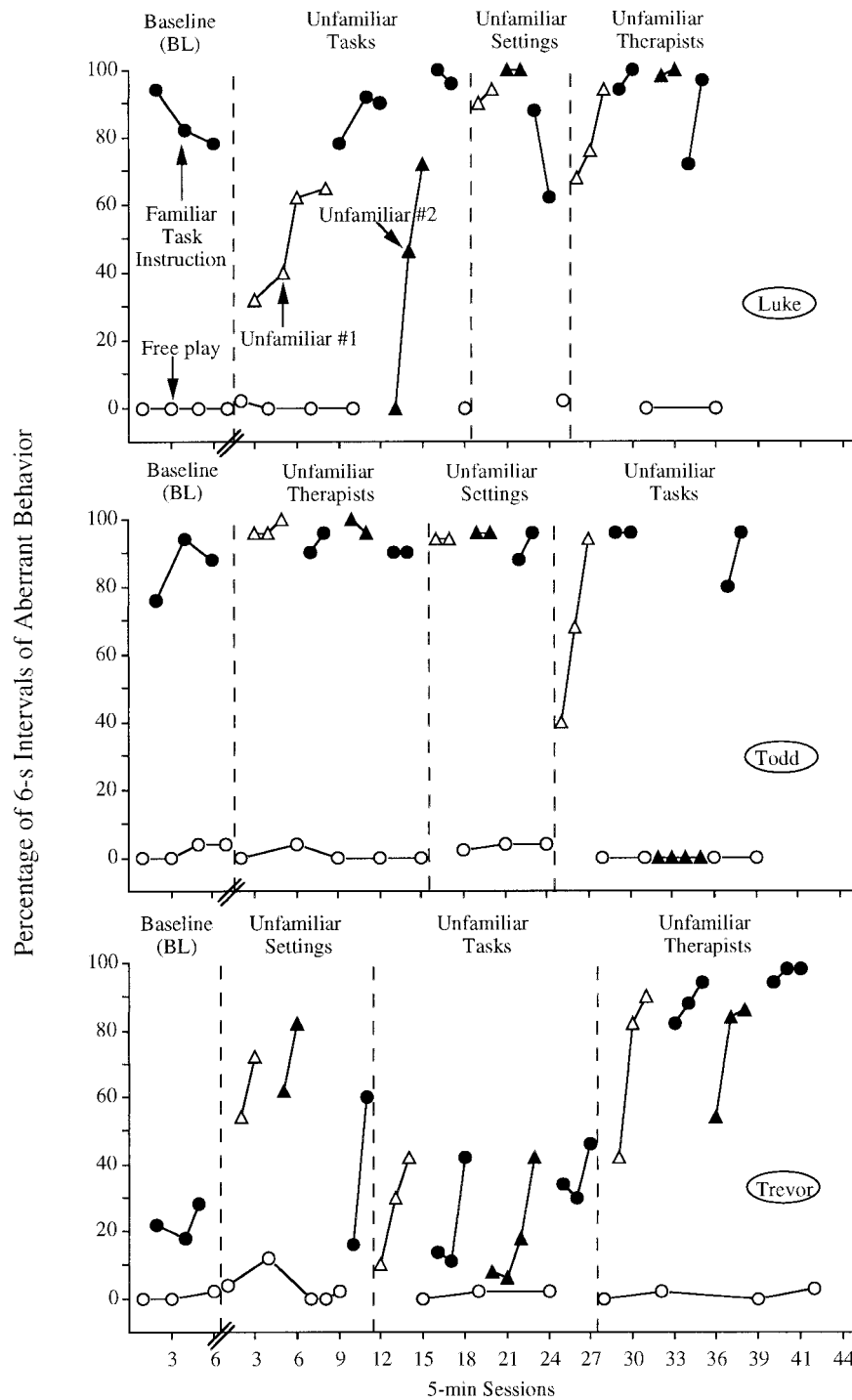


Figure 2. Percentage of 6-s intervals of aberrant behavior during analysis of range of antecedent stimuli for Luke (top panel), Todd (middle panel), and Trevor (bottom panel).

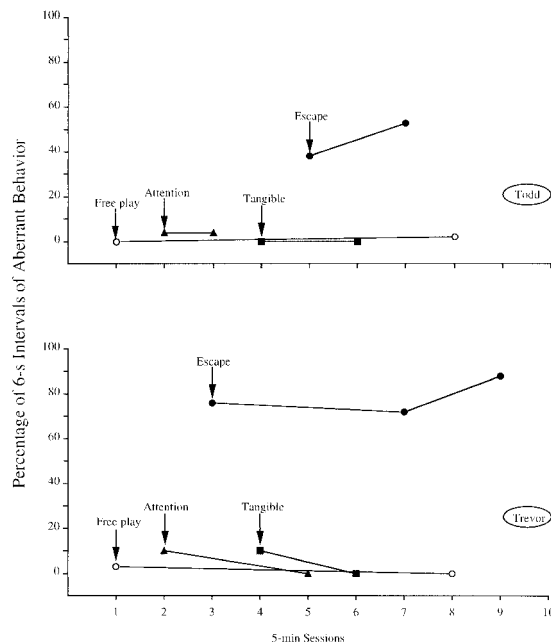


Figure 3. Percentage of 6-s intervals of aberrant behavior during experimental (functional) analysis of consequences for Todd (top panel) and Trevor (bottom panel).

aberrant behavior occurred during one or two sessions, but aberrant behavior increased across sessions. When the familiar task instruction was repeated, aberrant behavior initially decreased but then equaled or exceeded baseline levels across all other sessions during Phase 2 ($M = 51\%$; range, 11% to 98%). In comparison, during free-play sessions, mean frequency of aberrant behavior was 2% (range, 0% to 12%). Mean percentage of aberrant behavior across the two unfamiliar therapists was 73% (range, 42% to 90%). These results exceeded the baseline percentages of aberrant behavior. Task instructions consistently occasioned aberrant behavior, and a return to free play resulted in an immediate reduction of aberrant behavior.

PHASE 3: EXPERIMENTAL ANALYSIS OF CONSEQUENCES

The experimental analysis of consequences conducted for Todd and Trevor confirmed

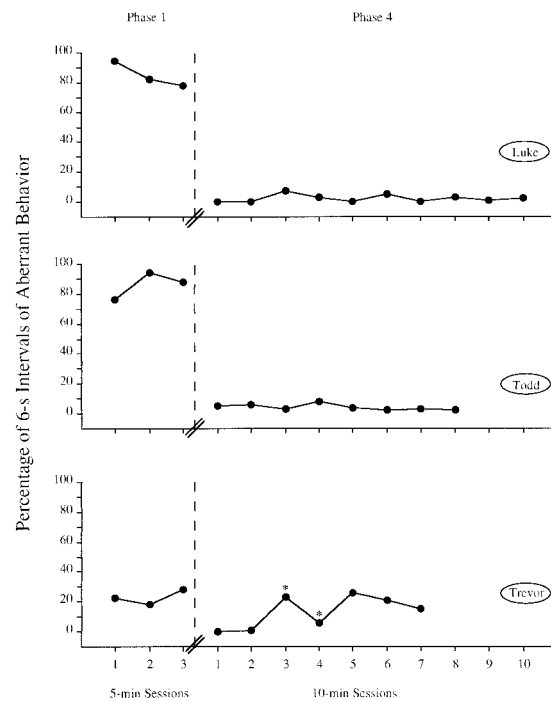


Figure 4. Percentage of 6-s intervals of aberrant behavior during Phase 1 (baseline and familiar task instructions) and Phase 4 (treatment) for Luke (top panel), Todd (middle panel), and Trevor (bottom panel). The asterisk indicates a medication change for Trevor.

that negative reinforcement maintained aberrant behavior (see Figure 3). Mean occurrence of aberrant behavior was 46% for Todd and 79% for Trevor during the contingent escape conditions. In contrast, few occurrences of aberrant behavior were observed during contingent tangible, contingent attention, and free-play conditions.

PHASE 4: TREATMENT

Aberrant Behavior

The results of the treatment package for Luke, Todd, and Trevor are presented in Figure 4. The data from the task instruction sessions from Phase 1 were used as a baseline comparison. With the introduction of Phase 4 (treatment), Luke's aberrant behavior decreased substantially ($M = 2\%$; range, 0% to 7%) and remained stable over 4 months.

Overall, a 98% reduction in aberrant behavior occurred with treatment during the first session (Phase 1 mean minus Phase 4 mean divided by Phase 1 mean multiplied by 100%). Similar findings occurred for Todd. With the introduction of treatment, Todd's percentage of aberrant behavior decreased substantially ($M = 4\%$; range, 2% to 8%) and remained stable over 3 months. Overall, a 96% reduction in aberrant behavior occurred with treatment.

Different results occurred for Trevor. Trevor's aberrant behavior decreased substantially during the first two treatment probes (0% and 1%, respectively), with more variable occurrence during the final five probes (overall $M = 13\%$; range, 0% to 26%). Overall, a 43% reduction in aberrant behavior occurred with treatment, but aberrant behavior continued to occur.

Compliance to Task Instructions and Percentage of Intervals of Task Engagement

The mean number of instructions provided, the percentage of instructions with which Luke, Todd, and Trevor complied, and the percentage of intervals of task engagement are presented as mean line, line graphs, and bar graphs, respectively, in Figure 5. For Luke, compliance increased substantially from Phase 1 ($M = 33\%$; range, 17% to 47%) to Phase 4 ($M = 91\%$; range, 81% to 100%), even when the number of instructions also increased (Phase 1 $M = 16$, Phase 4 $M = 20$). A similar increase occurred for the percentage of intervals engaged in the task (Phase 1 $M = 11\%$, Phase 4 $M = 35\%$).

For Todd, compliance increased substantially from Phase 1 ($M = 16\%$; range, 0% to 32%) to Phase 4 ($M = 88\%$; range, 78% to 93%), even though the number of instructions also increased (Phase 1 $M = 19$, Phase 4 $M = 25$). An increase also occurred

for the percentage of intervals engaged in the task (Phase 1 $M = 9\%$, Phase 4 $M = 27\%$).

For Trevor, compliance (Phase 1 $M = 86\%$; range, 84% to 89%; Phase 4 $M = 77\%$; range, 42% to 97%) and task engagement (Phase 1 $M = 55\%$; Phase 4 $M = 31\%$) decreased. In addition, the number of instructions made by the parent decreased slightly during Phase 4 (Phase 1 $M = 40$; Phase 4 $M = 34$). Thus, unlike Luke and Todd, Trevor's compliance was not correlated with reductions in the occurrence of aberrant behavior, and minimal improvement occurred.

Social Interactions

Social interaction data are depicted in Figure 6 for all participants. The results of the task instruction condition in Phase 1 continued to serve as baseline for all participants. For Luke, both child and parent positive social interactions increased substantially from Phase 1 to Phase 4 (child Phase 1 $M = 11\%$, Phase 4 $M = 76\%$; parent Phase 1 $M = 9\%$, Phase 4 $M = 75\%$). A decrease in the frequency of reprimands or redirections was also observed (Phase 1 $M = 16\%$, Phase 4 $M = 1\%$).

For Todd, both child and parent positive social interactions increased substantially from Phase 1 to Phase 4 (child Phase 1 $M = 10\%$, Phase 4 $M = 74\%$; parent Phase 1 $M = 9\%$, Phase 4 $M = 77\%$). A decrease in the percentage of reprimands or redirections also occurred (Phase 1 $M = 17\%$, Phase 4 $M = <1\%$). Similar to Luke, for all adult and child social interactions, positive and sustained effects were demonstrated during treatment.

For Trevor, there was a substantial increase in positive parent social interactions across Phases 1 and 4 (Phase 1 $M = 18\%$; Phase 4 $M = 66\%$). A decrease in reprimands or redirections also occurred (Phase 1 $M = 24\%$; Phase 4 $M = 1\%$). However, child social interactions remained un-

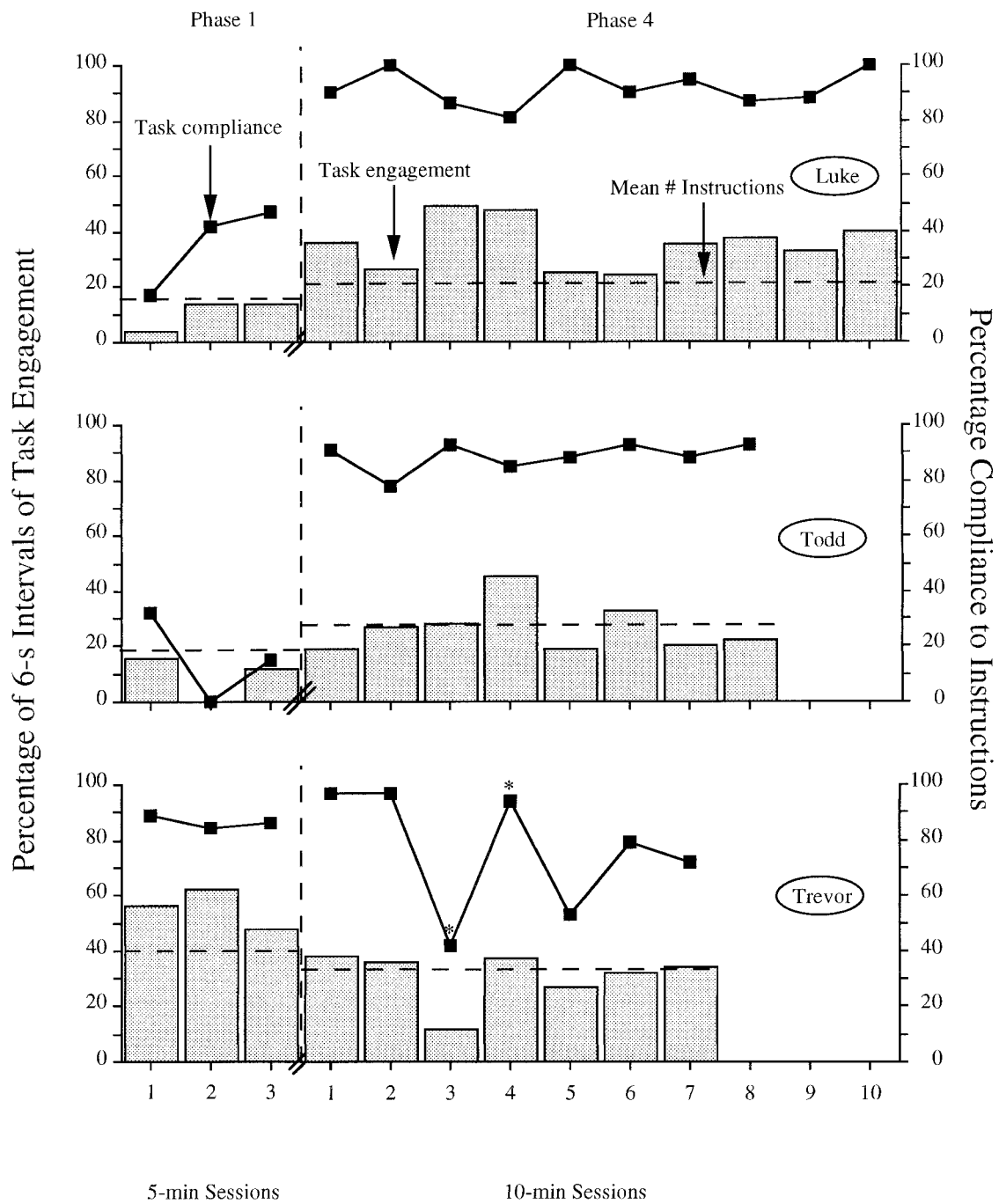


Figure 5. Percentage of intervals of task engagement, percentage of compliance to parent instructions, and mean number of task instructions delivered during Phase 1 (baseline and familiar task instructions) and Phase 4 (treatment) for Luke (top panel), Todd (middle panel), and Trevor (bottom panel). The asterisk indicates a medication change for Trevor.

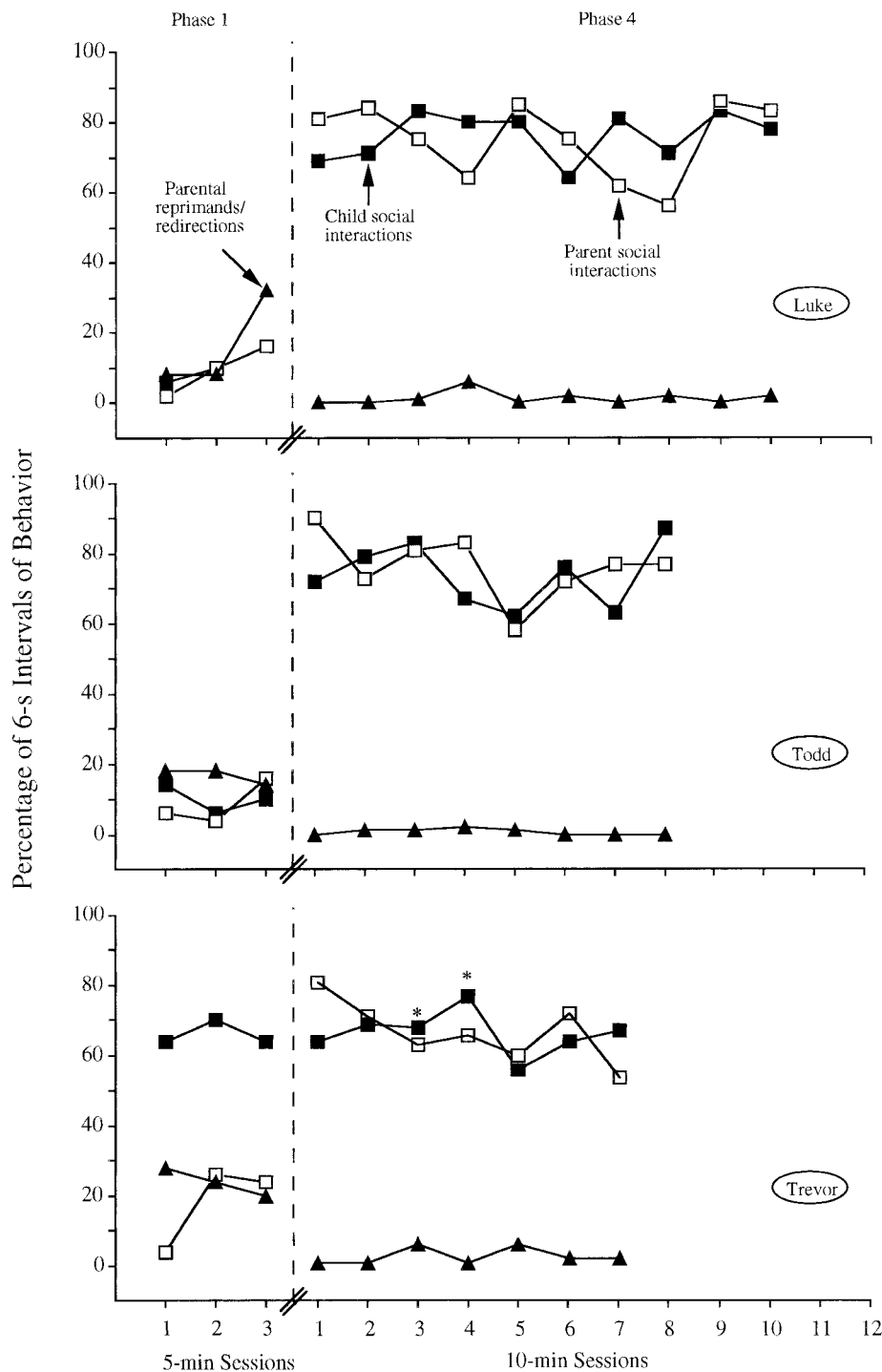


Figure 6. Percentage of 6-s intervals of parental reprimand or redirections, child social interactions, and parent social interactions during Phase 1 (baseline and familiar task instructions) and Phase 4 (treatment) for Luke (top panel), Todd (middle panel), and Trevor (bottom panel). The asterisk indicates a medication change for Trevor.

changed from Phase 1 to Phase 4 (Phase 1 $M = 66\%$; Phase 4 $M = 65\%$).

DISCUSSION

For each child, aberrant behavior was shown to occur only when task instructions were presented. Except for one task with 1 child, aberrant behavior followed instructions regardless of the tasks, who gave the instruction (e.g., unfamiliar or familiar therapist), or where the instruction was given (e.g., unfamiliar or familiar setting). During free play, when instructions were absent, aberrant behavior rarely occurred even though the task item, setting, and therapist remained the same. These results strongly suggested that the instruction itself occasioned aberrant behavior and that the specific task, specific setting, and specific therapist were usually irrelevant. This was directly tested in Phase 2. When instructions to comply with unfamiliar tasks were first introduced (Phase 2), lower percentages of aberrant behavior occurred, but an escalating trend in aberrant behavior occurred within two to three sessions. Thus, even when stimulus control did not occur immediately, it was acquired within 15 instructions. The results from Phase 2 show that even unfamiliar task instructions quickly gained stimulus control. These results are most likely due to a strong history of negative reinforcement across many other tasks, and Phase 3 confirmed that aberrant behavior was maintained by negative reinforcement for 2 of the boys.

Of interest was that, during Phase 2, aberrant behaviors stopped immediately when instructions were removed or were often temporarily disrupted when unfamiliar instructions were presented. Thus, even though the stimulus control associated with instructions was observed across a range of unfamiliar stimuli, it was restricted to instructions. This finding led us to embed instructions within the context of free play as

one of the primary treatment components because we hypothesized that interspersing instructions within free play would disrupt the antecedent stimulus–response relationship. By adding escape extinction, we also disrupted the aberrant behavior–reinforcer relationship. For Luke and Todd, quick and durable treatment effects occurred.

In the present study, specific discriminative stimuli (S^D s) within the context of the demand situation set the occasion for aberrant behavior when familiar task instructions were presented. The antecedent stimuli directly associated with the instruction, and not with the setting or therapist delivering instructions, were S^D s for aberrant behavior. Embedding the instructions within the context of a free-play situation may have reduced the saliency of the instructions as discriminative stimuli.

It would have been informative to conduct treatment in two phases. In Phase 4, we might have initially conducted escape extinction by presenting the task instructions separate from free play, similar to the procedure of Shore et al. (1994). Given the results of Phase 2, we would have anticipated an absence of generalization to other stimulus parameters, which is the finding reported by Shore et al. We could have then embedded task instructions within the context of free play and again evaluated generalization. It remains unclear whether the positive effects achieved during treatment would have generalized across stimulus parameters. It is also likely that escape extinction (Iwata, Vollmer, & Zarcone, 1990) was a critical component of treatment, but this was not evaluated directly. Finally, differential reinforcement of alternative behavior in the form of praise occurred following all desired behaviors, and choices of activities during free play were provided. We did not conduct a component analysis (Wacker et al., 1990) of these procedures and thus do not

know which of these variables contributed to the effects of treatment.

Another potential limitation of this study was that the rate of task instructions was changed in Phase 4, when the session was lengthened from 5 min to 10 min. Although our rationale was to keep the number of instructions similar across all phases, the effect of the change in the rate of instructions in Phase 4 is unknown.

We evaluated the collateral effects of treatment as a further indication of social validity. First, task-related behaviors were assessed by examining task compliance, time engaged in task demands, and the number of task instructions made by the parent. Second, parents increased their positive social interactions and decreased the frequency of reprimands or redirections during treatment. Finally, for child social behaviors, either positive or stable effects were demonstrated even though the number of instructions made by the parent also increased. These last two effects are important because they demonstrated that the child and parent interacted positively during instructions.

Only anecdotal information was obtained about the impact of the intervention on the daily lives of the participants. For example, for each child, new school programming options were available with decreased occurrence of aberrant behavior; parents reported application of the treatment strategies to other situations and activities and increased willingness to take their children into the community (e.g., to church and restaurants). This type of information might be collected in a more objective and reliable format in future investigations to further establish the social validity of home-based interventions with young children.

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STUDY QUESTIONS

1. What criteria were used for selecting the tasks presented to participants?
2. How was the method used for assessing interobserver agreement different than what is typically used?
3. What were the similarities and differences between the task instruction and free-play conditions during Phase 1?
4. How were tasks, settings, and therapists altered during Phase 2, and what were the results of these alterations?
5. To what extent did the results of each of the first three phases contribute to the intervention evaluated in Phase 4?
6. Briefly describe the functional components of the treatment procedures evaluated in Phase 4.
7. Decreases in aberrant behavior were generally associated with increases in appropriate behavior during Phase 4. How might the method used for recording data have differentially affected the occurrence of appropriate behavior across conditions?
8. The authors noted that, although type of task, therapist, and setting did not differentially affect aberrant behavior, “antecedent stimuli directly associated with the task instruction” seemed to function as discriminative stimuli for aberrant behavior. What other process may have accounted for the occurrence of aberrant behavior in the presence of task instructions?

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